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10/774,131

02/06/2004

Jorg Freudenberger

P03,0608

8391

7590

11/17/2005

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EXAMINER

ARTMAN, THOMAS R

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 11/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/774,131

Applicant(s)

FREUDENBERGER ET AL.

Examiner

Thomas R. Artman

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02 July 2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5-7 and 13-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding all the above claims, the term "allows" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4 and 9-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Donnelly (US 2005/0129169 A1).

Regarding claims 1 and 9, Donnelly discloses a monochromator (Fig.2), including:

- a) a crystal 13 having a property of spectrally restricting X-rays, and
- b) a positioning device 12 connected to the crystal to move the crystal relative to X-rays emitted by an X-ray radiator to change the spectral composition of the X-rays.

With respect to claims 2 and 10, Donnelly further discloses that the positioning device moves the crystal to alter an angle between at least a portion of the X-rays and the crystal (par.0018, lines 19-23).

With respect to claims 3 and 11, Donnelly further discloses that the positioning device moves the crystal into and out of a path of X-rays (par.0018, lines 19-23).

With respect to claims 4 and 12, Donnelly further discloses a control device 6 connected to the positioning device for automatically controlling the positioning device to control movement of the crystal.

Claims 1, 2, 4-6, 8-10, 12-14 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhong (US 6,038,285).

Regarding claims 1 and 9, Zhong discloses a monochromator (Fig.5), including:

- a) a crystal 30 having a property of spectrally restricting X-rays, and
- b) a positioning device 50 connected to the crystal to move the crystal relative to X-rays emitted by an X-ray radiator to change the spectral composition of the X-rays (col.2, lines 42-45).

With respect to claims 2 and 10, Zhong further discloses that the positioning device moves the crystal to alter an angle between at least a portion of the X-rays and the crystal (col.2, lines 42-45).

With respect to claims 4 and 12, Zhong further discloses a control device connected to the positioning device for automatically controlling the positioning device to control movement of the crystal (not shown).

With respect to claims 5 and 13, Zhong further discloses that the crystal spectrally restricts X-rays, where the restricted X-rays have an energy spectrum with a maximum value, and the control device allows the setting of the maximum value (above or below the absorption edge of Iodine, col.2, lines 42-45 and col.5, lines 20-25).

With respect to claims 6 and 14, Zhong further discloses that the X-rays emitted by the radiator have an energy spectrum with a first maximum value, and the crystal spectrally restricts the X-rays at a second maximum value, where the control device allows the setting of the factor between the first and second maximum values and controls the positioning device dependent upon the set factor (essentially a factor of 1, where the crystal is set to essentially the same maximum as the maximum energy from the source, col.5, lines 20-25).

Regarding claims 8 and 16, Zhong discloses an X-ray device and a monochromator (Figs.5-7), including:

- a) an X-ray radiator that emits X-rays of a spectral range,
- b) a crystal 30 that spectrally restricts X-rays,
- c) a positioning device 50 connected to the crystal to move the crystal relative to the X-rays emitted by the X-ray radiator to change the spectral composition of the X-rays, and
- d) a control device (not shown) connected to the positioning device for automatically controlling the positioning device to control movement of the crystal dependent upon an operating voltage of the X-ray radiator (deflection voltage to deflect the e-beam, col.5, lines 30-35. Zhong does not specify the acceleration voltage of the e-beam, but it inherently must be equal to or higher than the highest energy required of the imaging method of 34.72 keV).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhong, as applied to claims 6 and 14 above, respectfully.

Zhong does not specifically disclose setting a factor of 0.3 to 0.8 between the first and second energy maxima. As stated above, Zhong suggests a ratio roughly equal to 1; however, since the accelerating voltage of the e-beam is not specified, then the maximum energy of the X-ray beam from the X-ray radiator is not fully known. Thus, the actual factor between the maximum energies of Zhong's operation is not fully known.

However, it is known to one skilled in the art that the accelerating voltage (which is equal to the maximum energy of the emitted X-ray beam) must be at least equal to or higher than the highest desired energy, which in the case of using an iodine contrast agent, is about 35 kV (col.5, lines 20-25). Therefore, Zhong's accelerating voltage, and thus the maximum energy emitted by the source, is more than 35kV.

Zhong does state that the monochromator can be tuned to select any desirable energy from an incident X-ray beam. Further, such selectivity is useful when performing dual-energy contrast imaging with contrast agents by choosing energies that are above and below the K-edge absorption of the contrast material (col.2, lines 50-60). Zhong provides the example of iodine,

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and the disclosure elaborates on the details of implementing the invention in the situation where iodine is used. It is also clear to one skilled in the art that the disclosure is not limiting to iodine, as iodine is provided as an example only (lines 59-60). There are other known contrast agents commonly used, such as barium, which has a unique K-edge absorption energy different than that of iodine. Thus, it is known to one skilled in the art to select the appropriate energy(ies) for the specific contrast agent used or material/tissues of interest in the object being examined for accurate imaging and diagnostics, as taught by Zhong.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the select the appropriate energies (factor between maximum energy output and maximum energy passed through the crystal) for the specific contrast agent and/or materials of interest for maximizing the quality of the image of the material of interest, as taught by Zhong.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Graeff (US 4,736,398), Golovchenko (US 4,365,156) and Middleton (US 5,268,954) teach tunable/variable monochromators for automatically selecting specific energies from "white light" X-ray sources for specific imaging applications.

Ishijima (US 3,806,726) teaches an X-ray device where an operating voltage of the detector is changed as a function of the position of a monochromator with respect to the detector.

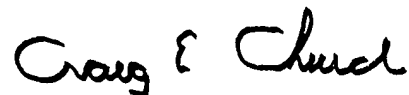
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas R. Artman
Patent Examiner



Craig E. Church
Primary Examiner